

The Philosophy Applied

Using NAI tools to Help communities cope with floods,
storms, sea level rise, and climate change

2008 Massachusetts Smart Growth – Smart Energy Conference

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NOAA Coastal Services Center
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY



Overview

- Moving to the Coast
- StormSmart Coasts Generally
- Looking Closely at the Tools
 - Proactive approaches
 - Putting existing language to use



A photograph of a beach with waves crashing onto the shore. The text "Moving to the Coast" is overlaid in the center.

Moving to the Coast



The Monetary Burden

	Total Losses	Closed Losses	Open Losses	CWOP Losses	Total Payments
Scituate	3,071	2,752 (13%)	0	319	\$49,629,842 (17.7%)
Revere	2,414	2,013 (9.5%)	3	398	\$14,358,062 (5.1%)
Marshfield	1,255	1,051 (5%)	1	203	\$13,487,809 (4.8%)
Hull	2,068	1741 (8.2%)	0	327	\$12,148,369 (4.3%)
MA Coasts Total	21,267	17,257 (81%)	12	4002	\$217,913,069 (78%)
MA Total	26,643	21,221	43	5,379	\$279,663,492

StormSmart Coasts

A General Look



StormSmart: [home](#) | [No Adverse Impact](#) | [legal issues](#) | [funding](#) | [site map](#) | [contact us](#)
Technical Assistance: [hazard identification & mapping](#) | [planning](#) | [regulations & development standards](#)
[mitigation & shore protection](#) | [infrastructure](#) | [emergency services](#) | [education & outreach](#)

Welcome to StormSmart Coasts

The StormSmart Coasts program is designed to help people working in coastal communities address the challenges arising from storms, floods, sea level rise, and climate change, and provides a menu of tools for successful coastal floodplain management.

StormSmart Coasts Building Blocks



- ▶ [Hazard Identification & Mapping](#)
- ▶ [Planning](#)
- ▶ [Regulations & Development Standards](#)
- ▶ [Mitigation & Shore Protection](#)
- ▶ [Infrastructure](#)
- ▶ [Emergency Services](#)
- ▶ [Education & Outreach](#)

Background & Resources



- ▶ [No Adverse Impact](#) (how to protect people and property rights)
- ▶ [Legal Information](#)
- ▶ [Funding Sources](#)
- ▶ [StormSmart Coasts News](#)
- ▶ [About StormSmart Coasts](#)

Where to Begin

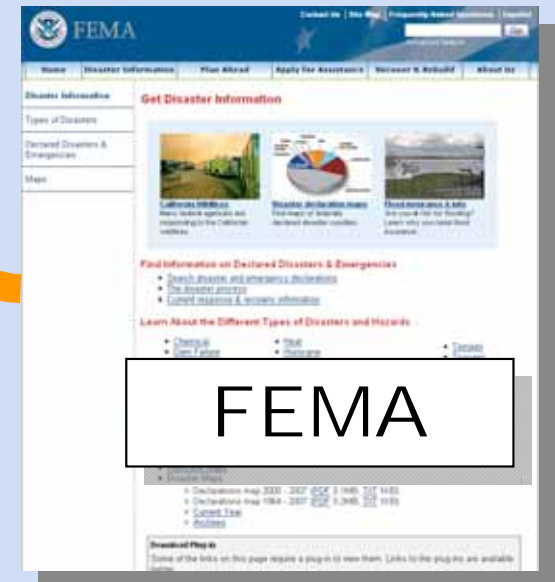
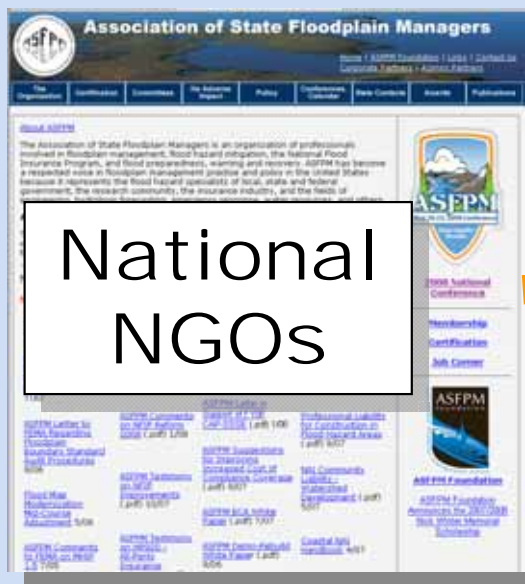
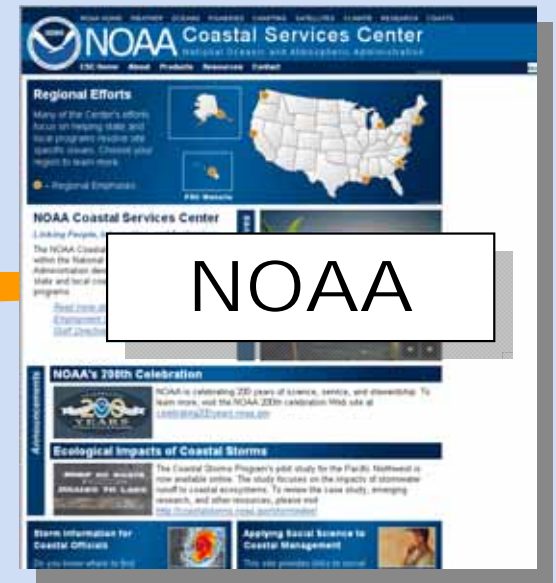
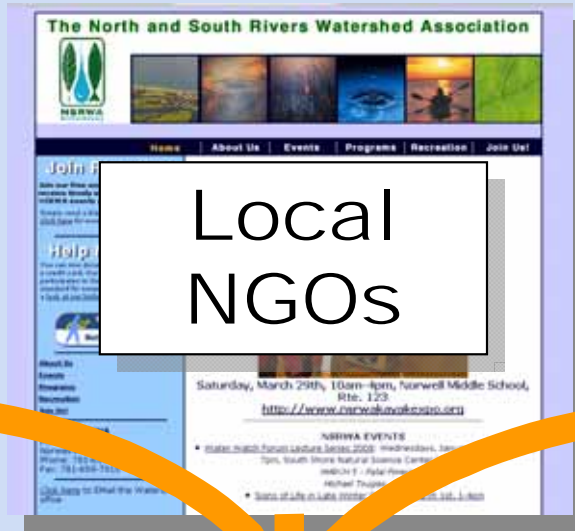


I'm with the...

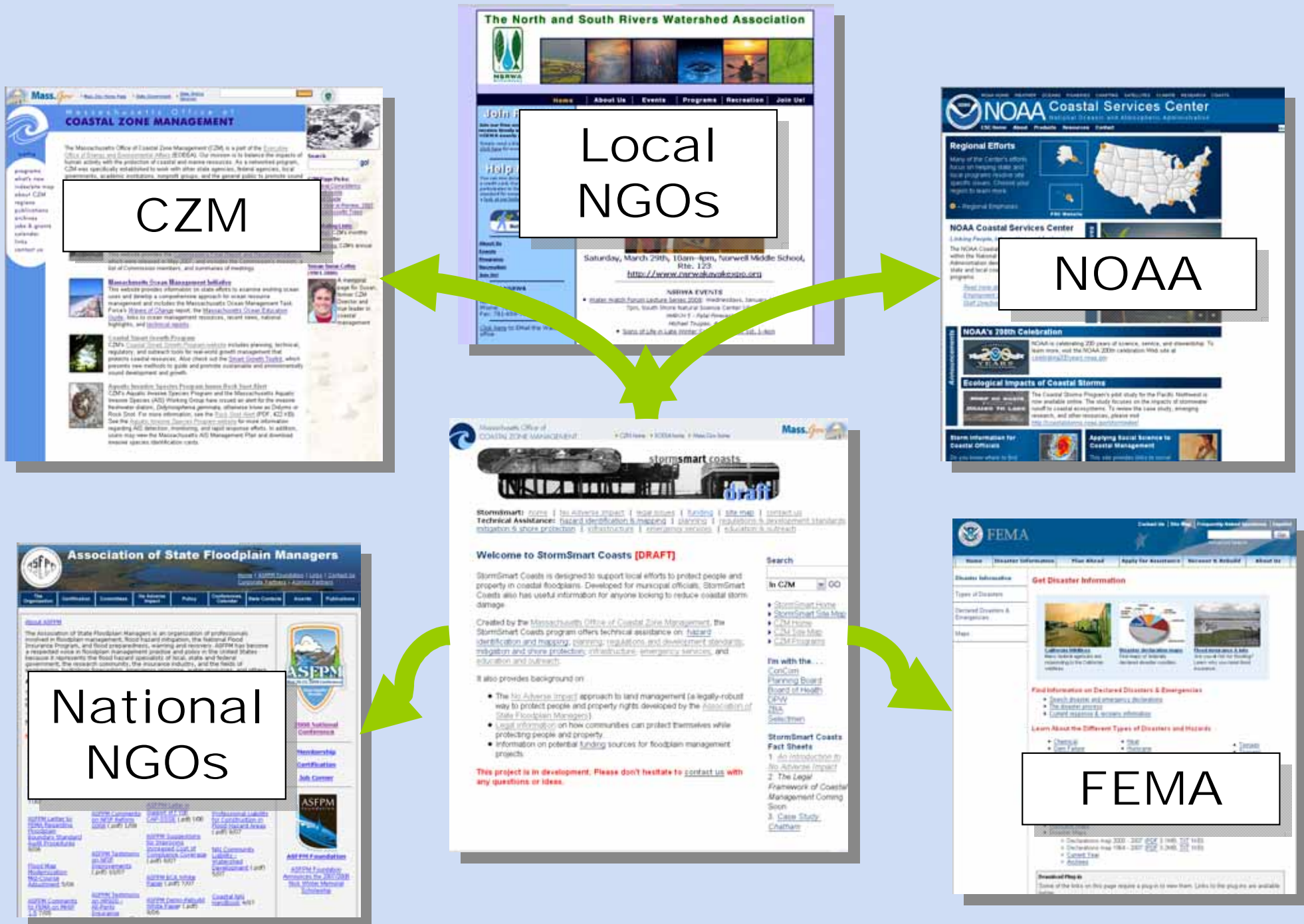
- ▶ [Board of Health](#)
- ▶ [Board of Selectmen](#)
- ▶ [Building Department](#)
- ▶ [Conservation Commission](#)
- ▶ [Department of Public Works](#)
- ▶ [Planning Board](#)
- ▶ [Zoning Board of Appeals](#)

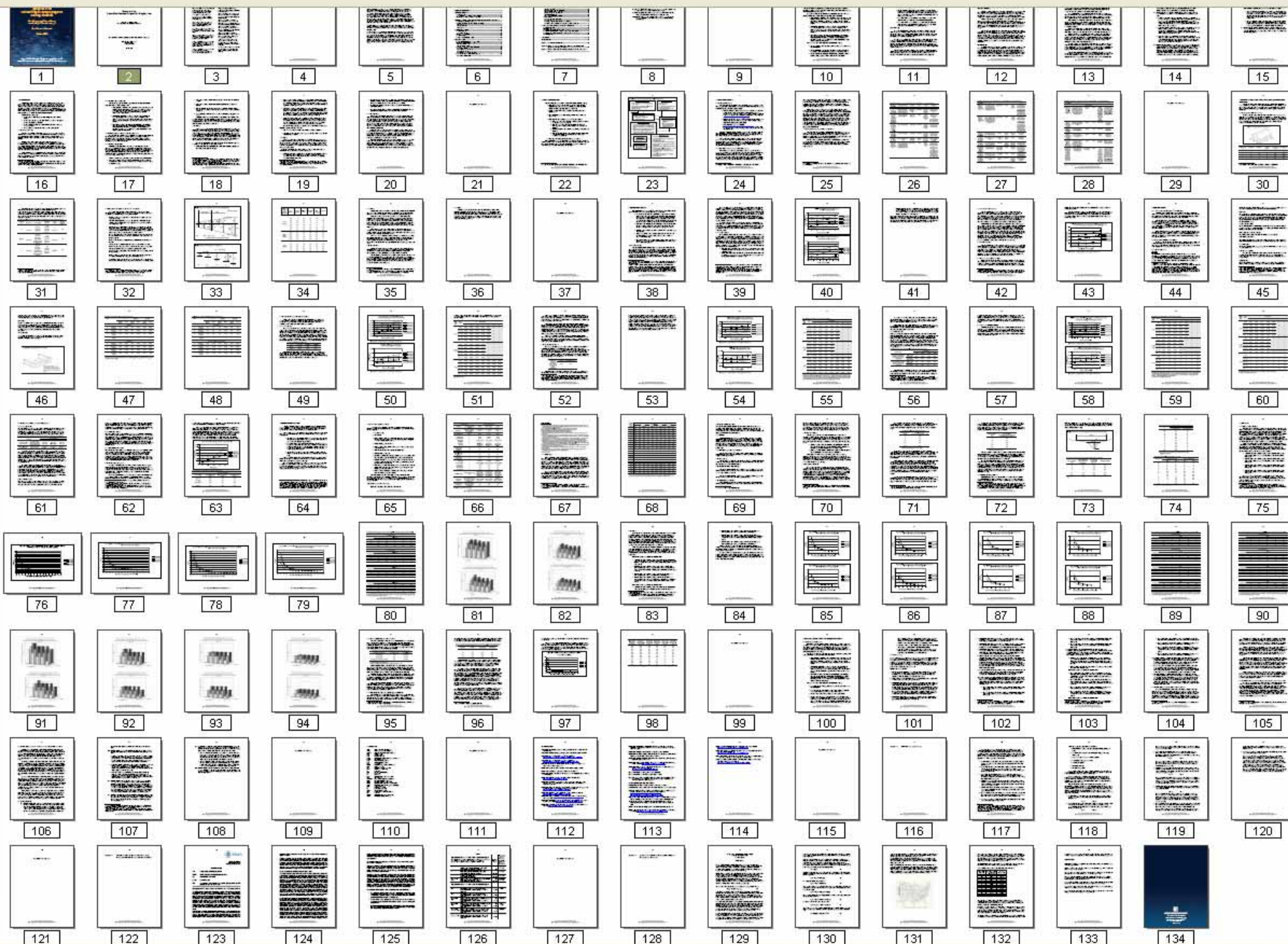
No Adverse Impacts
(NAI)

Information Hub



Information Hub







RAISE YOUR HOME, LOWER YOUR MONTHLY PAYMENTS

Protect buildings and reduce monthly expenses with freeboard

WITHOUT FREEBOARD



Annual flood insurance: **\$5,499**

WITH 3' FREEBOARD



Annual flood insurance: **\$2,084**

Elevating a home a few feet above legally mandated height has very little effect on the overall look of a home, yet it can lead to substantial reductions in flood insurance, substantially decrease the chances a home will be damaged by storms and flooding, and help protect against sea level rise.

What is freeboard?

Freeboard is elevating a building's lowest floor above predicted flood elevations by a small additional height (generally 1-3 feet above National Flood Insurance Program [NFIP] minimum height requirements).

Elevating a home a few feet above legally mandated heights has very little effect on the overall look of a home, yet it can lead to substantial reductions in flood insurance, substantially decrease the chances a home will be damaged by storms and flooding, and help protect against sea level rise.

What are the benefits of freeboard?

Increased protection from floods and storms. Storm waters can and do rise higher than shown on Flood Insurance Rate Maps (FIRMs). Freeboard helps protect buildings from storms larger than those that FIRMs are based on, and provides an added margin of safety to address the flood modeling and mapping uncertainties associated with FIRMs.

Better preparation for ongoing sea level rise. Massachusetts has experienced a relative sea level rise of approximately 1 foot over the past 100 years. Since elevations

on FIRMs do not include sea level rise, freeboard will help keep structures above floodwaters as storm surge elevations increase.

Greatly reduced flood insurance premiums. Recognizing that freeboard reduces flood risk, the Federal Emergency Management Agency (FEMA, which administers the NFIP) provides substantial (sometimes more than 50 percent) reductions in flood insurance premiums for structures incorporating freeboard. These savings can rapidly accumulate, especially over the life of a normal mortgage.

What are the costs of freeboard?

The expense of incorporating freeboard into new structures is surprisingly low, generally adding only about 0.25 to 1.5 percent to the total construction costs for each foot of added height, according to a 2006 FEMA-commissioned study (*Evaluation of the National Flood Insurance Program's Building Standards*). The minor resulting increase in monthly mortgage payments is generally more than offset by savings on NFIP premiums. Consequently, adding freeboard typically saves homeowners money.

Example of savings on NFIP premiums* with freeboard

	V Zone		A Zone	
	Annual savings in NFIP premiums	Savings over 30-year mortgage	Annual savings in NFIP premiums	Savings over 30-year mortgage
1' freeboard	\$1,360 (25%)	\$40,800	\$502 (41%)	\$15,060
2' freeboard	\$2,730 (50%)	\$81,900	\$678 (55%)	\$20,340
3' freeboard	\$3,415 (62%)	\$102,450	\$743 (60%)	\$22,290

*NFIP premiums based on May 2007 rates for a one-floor residential structure with no basement built after a FIRM was issued for the community (post-FIRM rates differ from pre-FIRM rates). \$300 deductible, \$250,000 coverage for the building, \$100,000 for contents.

Consider, for example, a proposed one-story building in the V zone¹ that will cost \$250,000 to build at minimum legal standards (the NFIP requires that all homes in the floodplain be elevated to at least the base flood elevation [BFE], mapped on FIRMs). According to the study cited above, adding each foot of freeboard to a home on piles or piers adds about 0.4 percent to total construction costs (about \$1,000 a foot in this example). If the owner takes out a mortgage at 6.5 percent APR for the total construction costs, he or she will have lower monthly payments (mortgage plus NFIP premiums) with 3 feet of freeboard, even though the construction costs are higher.

Home at minimum legal height	
Monthly mortgage payments	\$1,580.17
Monthly flood insurance	+ \$ 459.25
Total monthly cost	= \$2,039.42
Home with 3' of freeboard	
Monthly mortgage payments	\$1,599.13 (+\$18.96)
Monthly flood insurance	+ \$ 173.67 (+\$24.55)
Total monthly cost	= \$1,772.80 (-\$266.62)

In this example, adding 3 feet of freeboard saves the homeowner \$266.62 per month, or \$96,623.67 over a 30-year mortgage. Benefits in A zones² are generally less dramatic, but still substantial. To determine NFIP premiums for a specific property, see a licensed insurance agent.

Who can benefit from freeboard?

Nearly everyone building in floodplains can better protect themselves and their property and save on flood insurance by including freeboard into their construction and reconstruction projects. Additional benefits include:

- Homeowners - Whether or not you live in the house year-round, having it elevated increases the chances that it will weather storms safely, decreasing your worry and protecting your investment. If you're building a new home, or doing a renovation, ask your builder/designer about incorporating freeboard.
- Builders/contractors - Freeboard provides a competitive edge over other builders, allowing you to market the benefits of reduced flood insurance and flood risk to potential buyers. When doing retrofits (especially those requiring bringing structures up to current NFIP standards), explain the benefits of freeboard to your clients.

Municipalities - When constructing new municipal buildings (schools, fire stations, etc.) use freeboard as a means of saving tax dollars. Encourage all new construction in your community to include freeboard. (NOTE: the Massachusetts Attorney General's office has recently rejected bylaws requiring freeboard, but municipalities may promote its use).
Businesses - Freeboard helps: protect your buildings, important records, and inventory from flooding; drastically decrease your recovery/clean-up time after storm; and potentially save your business. The Institute for Business and Home Safety reports that more than 25 percent of businesses that close due to storm damage never reopen.

For more information...

- For technical information on the costs of incorporating different flood-resistant building techniques (including freeboard), see the American Institutes for Research's *Evaluation of the National Flood Insurance Program's Building Standards* 2006 study at www.fema.gov/library/viewRecord.do?id=2592.
- For general information on the National Flood Insurance Program, see www.FloodSmart.gov.
- For specific questions on flood insurance rates, see a licensed insurance agent.
- Communities looking for more information on the National Flood Insurance Program can contact Richard Zingarelli, Massachusetts NFIP Coordinator: (617) 626-1406, Richard.Zingarelli@state.ma.us.
- For general information on how Massachusetts communities can protect themselves from storms, see the StormSmart Coasts website at mass.gov/czm/stormsmart.
- Businesses looking to prepare for storms and other catastrophic events should visit the Institute for Business and Home Safety's website at www.ibhs.org.

¹ V zones: This Flood Insurance Rate Map (FIRM) designation refers to coastal areas that are subject to the highest levels of wave energy and flooding.

² A zones: Also a FIRM designation, coastal A zones are subject to flooding but with less wave energy than V zones (i.e., wave heights less than 3 feet).

Co-missioned with Massachusetts:
Deputy L. Patrick, Governor
Theodore F. Murray, Lieutenant Governor

Executive Office of Energy and Environmental Affairs
Ian A. Bowles, Secretary

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This fact sheet was developed through CZM's StormSmart Coasts program, which supports community efforts to manage coastal floodplains. For further information on StormSmart Coasts, visit www.mass.gov/czm/stormsmart.

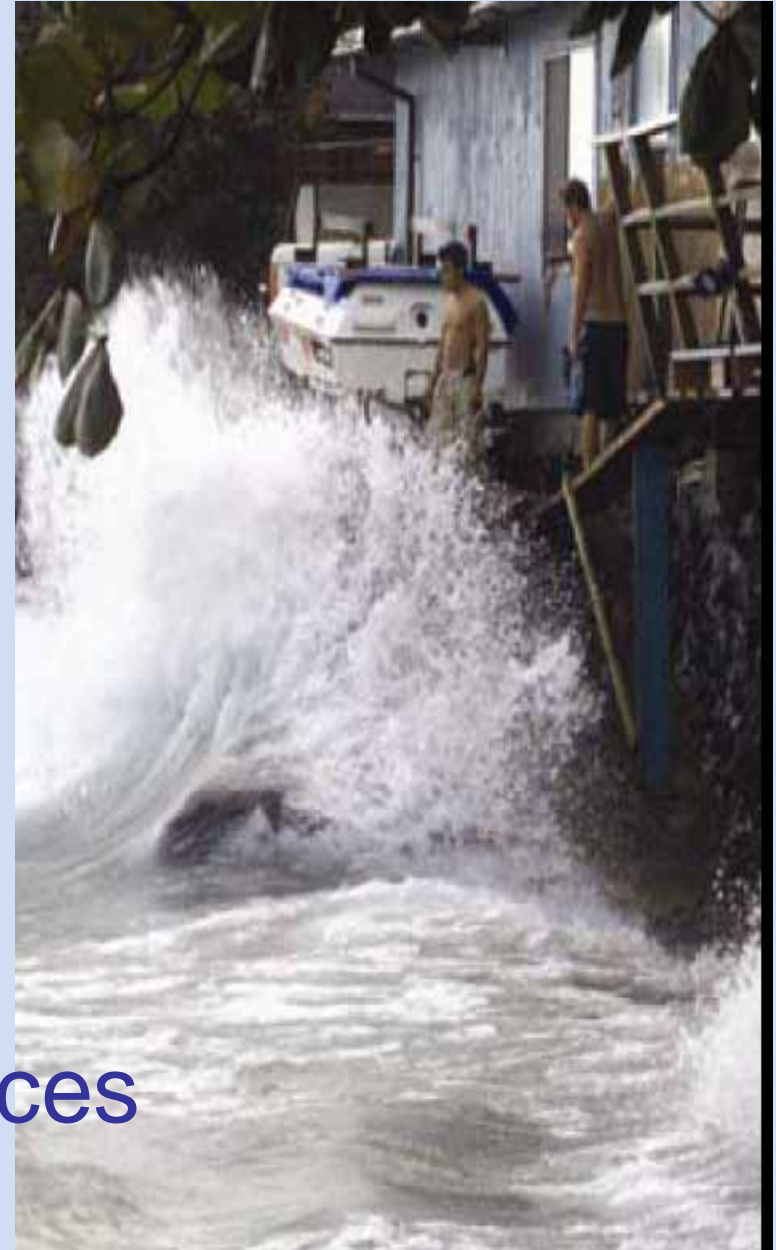
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Partnerships

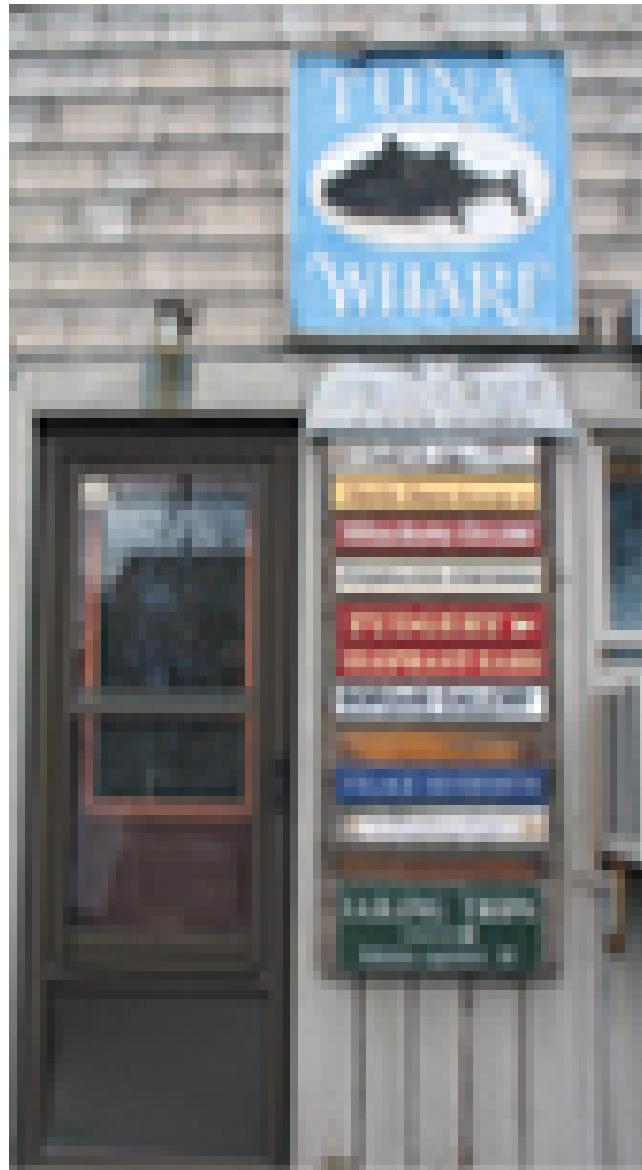
- Pilot Communities
- Coastal Advisory Group
- Ongoing Transference
- Enhancing Current Resources



Looking Closely at the Tools

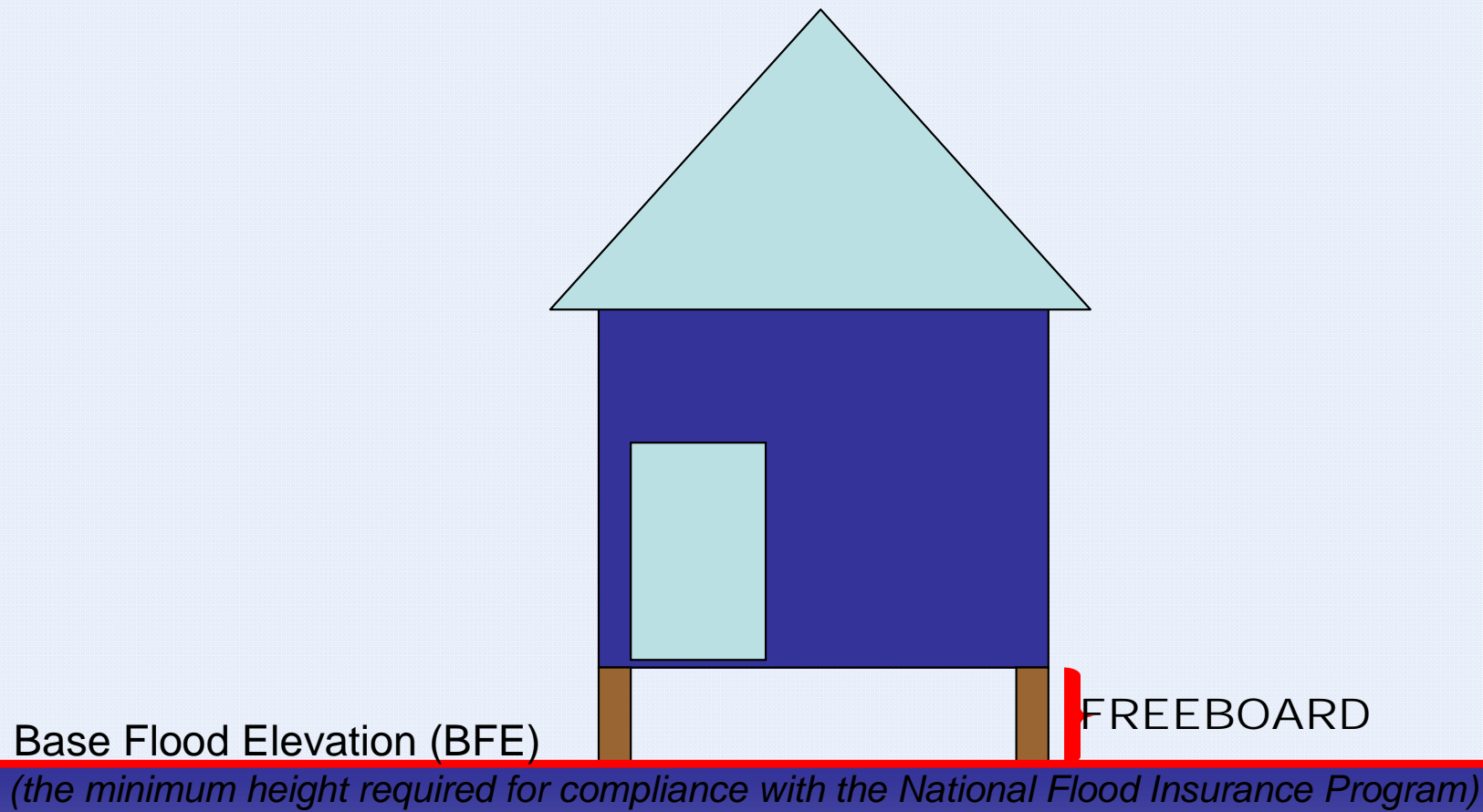


StormSmart Coasts Building Blocks



- ▶ Hazard Identification & Mapping
- ▶ Planning
- ▶ Regulations & Development Standards
- ▶ Mitigation & Shore Protection
- ▶ Infrastructure
- ▶ Emergency Services
- ▶ Education & Outreach

freeboard



freeboard?



**~\$1,000 per foot
of freeboard
(+~\$18/month)**

WITHOUT FREEBOARD



Annual flood insurance: \$5499

WITH 3' FREEBOARD



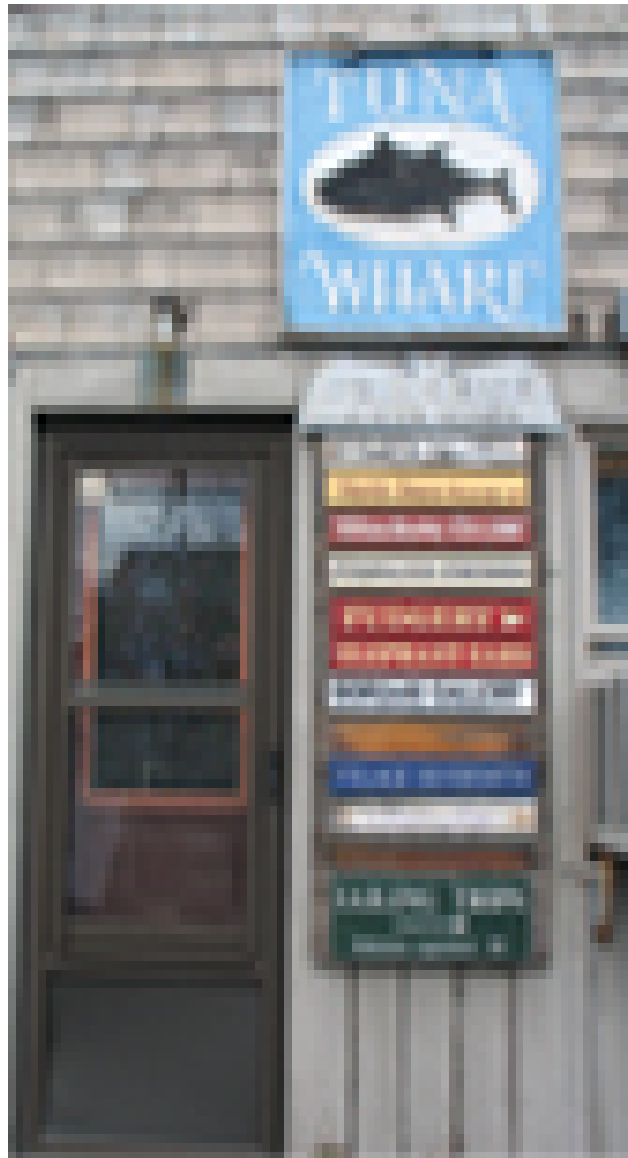
Annual flood insurance: \$2084

(- \$284/month)

Homeowner savings

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Transfer of Development Rights

Owner of “sending” parcel sells development rights in exchange for permanent conservation easement.

preservation area



growth area



Owner of “receiving” parcel buys development rights to build at densities higher than allowed under base zoning.

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The Tools Already Exist

Content of the Purpose and Intent Section of Zoning By-Laws

Town	Safety
Duxbury	Flood
Falmouth	Flood
Hull	***
Kingston	***
Newburyport	Flood
Oak Bluffs	***
Plymouth	Flood
Provincetown	***
Tisbury	Flood

In pursuance of authority conferred by MGL c. 40A, §§ 1 to 17, inclusive, and all acts in amendment thereof, and for purposes including but not limited to promoting the health, safety, convenience, and welfare of the inhabitants of the Town of Plymouth, and more particularly to promote the most appropriate use of land throughout the Town in accordance with a comprehensive plan; to preserve and increase its amenities; to secure safety from flooding and other dangers; to lessen congestion in the streets; to prevent overcrowding of land; to conserve the value of land and buildings; to facilitate the adequate provision of transportation, water, sewerage, schools, parks, and other public requirements; and for other appropriate purposes, the Town of Plymouth does hereby enact the following regulations to be known as the "Zoning Bylaw of the Town of Plymouth."

SECTION 1.0 PURPOSE AND AUTHORITY

1.1 PURPOSE

These regulations are enacted to promote the general welfare of the Town, to protect the health and safety of its inhabitants, to encourage the most appropriate use of land throughout the town, to preserve the cultural, historical and agricultural heritage, and flooding, to increase the amenities of the town, and to reduce the hazard from fire by regulating the location and use of buildings and the area of open space around them, all as authorized by, but not limited by, the provisions of the Zoning Act, G.L. c. 40A, as amended, and Section 2A of 1975 Mass. Acts 808.









Coastal Hazards/Land Subject to Coastal Storm Flowage

- CZM recommends the proponent consider alternative project designs that will reduce potential impacts associated with the proposed project and has offered to work with the proponent to assess and recommend these options.
- CZM recommends that the proposed project be designed to be consistent with the Association of State Floodplain Managers (ASFPM) “No Adverse Impact” (NAI) approach to land management in the floodplain.



The Philosophy Applied

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storms, sea level rise, and climate change

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